

# ISPECTRUM

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MAGAZINE

**INTERVIEW:**

**LISA RANDALL**

**THE PHYSICIST WHO KNOCKED  
ON HEAVEN'S DOOR**

**PSYCHOLOGICAL  
FACTORS IN SUICIDE**

**ELECTROMAGNETIC  
FIELDS INFLUENCE**

**KEEPING YOUR  
BRAIN HEALTHY**

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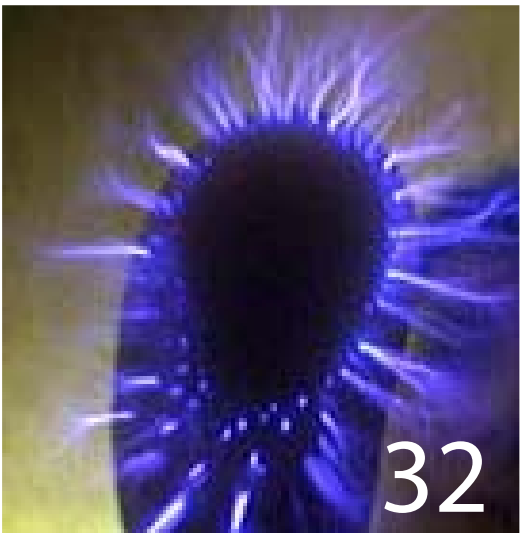
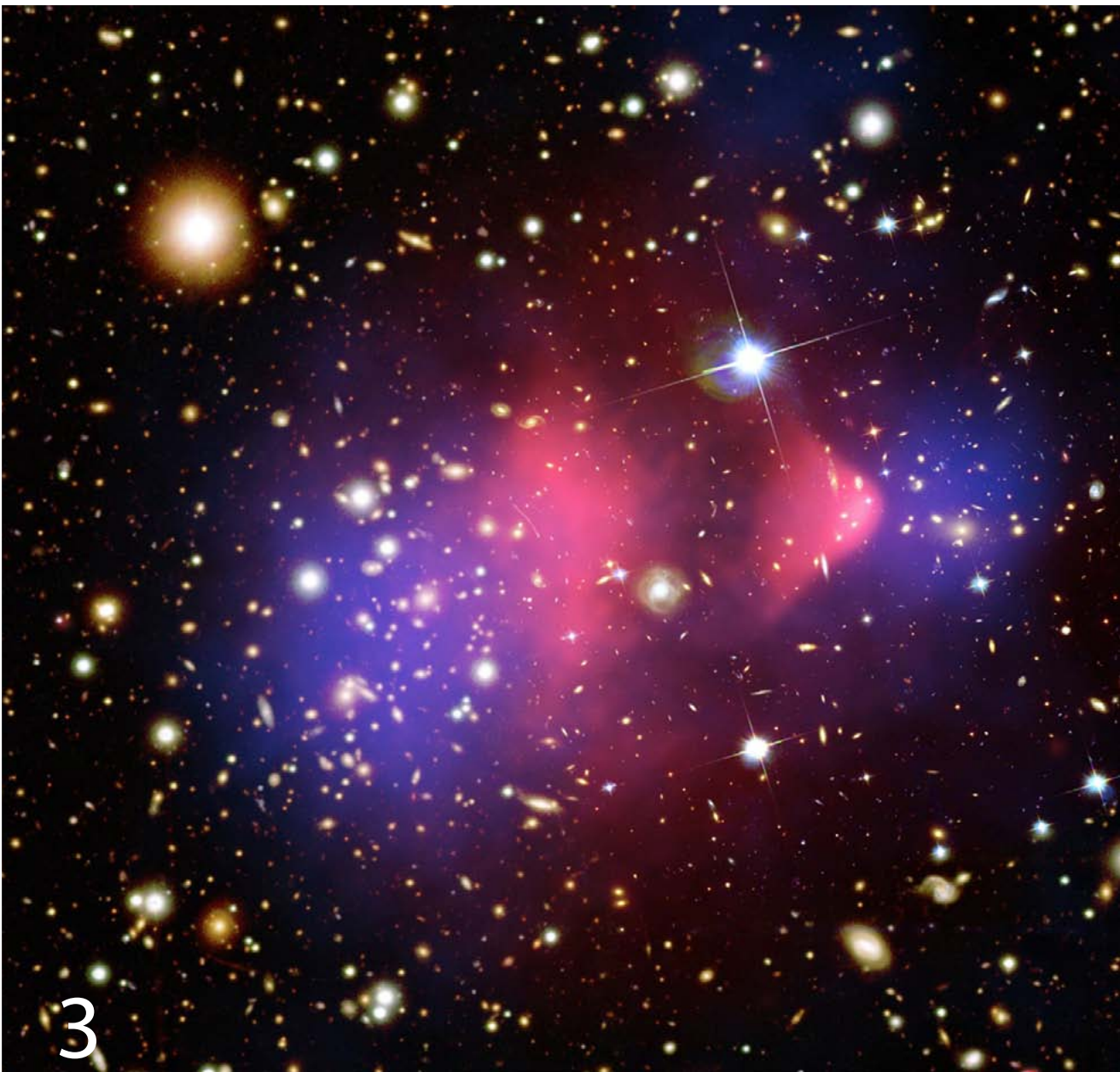
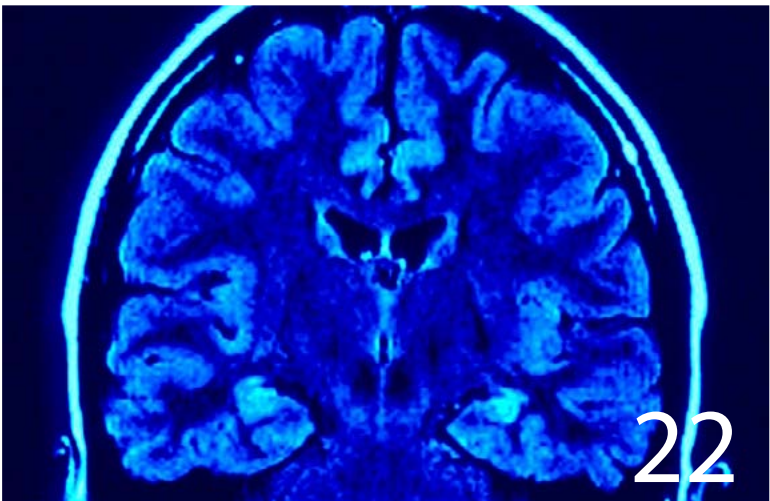


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# editorial

Here we go with the second issue of Spectrum Magazine, full of content that may interest you, such as physics, psychology, health etc. We are proud to say that we've had the pleasure of interviewing Lisa Randall from the University of Harvard, one of the most brilliant minds of our century in matters of physics, hidden universes, additional dimensions and dark matter.

We also have another feature related to physics in the Russian physicist Dr. Korotkov's article about the influence of electromagnetic fields, based on his own research. I'm pretty sure that many of you wonder often about the possible risks we are exposed to by living in a world extremely contaminated by artificial electromagnetic fields, so here you have, in this issue, a little starter for beginning to learn more about this.

Dr. Dennis Crawford from The United States has written an interesting article, with tips and clues that are going to help us keep our brains healthy. Also don't miss reading Rob Hutchinson's article about the motivational factors in relation to suicide. Rob is one of our most active collaborators in the field of psychology in the Spectrum Magazine blog, despite working in Chile as an English teacher for the last three years. He is from United Kingdom and studied Psychology at Manchester University.

Enjoy reading!



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# THE PHYSICIST WHO KNOCKED ON HEAVEN'S DOOR

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## INTERVIEW LISA RANDALL

BY

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*She is one of the most highly-cited thinkers in theoretical physics. Lisa Randall is an expert on particle physics, string theory and cosmology at Harvard. Her theories about hidden dimensions and dark matter are not only revolutionary but most likely.*

*Considered as one of the people with more influence in the scientific paradigms of the XXI century, everybody knew that she was into something big when Stephen Hawking saved her a seat at a banquet after a conference where she presented her work. She has another great skill: to explain the mysteries of physics to the general public in a very attractive and interesting way, and if you read her top selling books **Knocking on Heaven's Door** and **Warped Passages** you will understand what I mean. A couple of weeks ago, I had the pleasure of interviewing this amazing woman, and these were her amazing answers.*





photo:NASA

M.M.

One of your most famous theories is about dark matter. Can you explain what it is about?

L.R.

Dark matter is matter that is a lot like the stuff we know except that it doesn't interact with light. We know about its existence because of its gravitational influence on the galaxy and the universe. In our galaxy, we know that although ordinary matter sits in a disk, dark matter surrounds it in a spherical halo.

In principle, dark matter could have non-gravitational interactions as well. However, so far there has been no evidence of such interactions. In fact, the strength of dark matter interactions is very constrained. If dark matter interactions were bigger, the halo shape would not agree with observations. Furthermore, observations of the Bullet Cluster clearly indicate that



*NASA CXC M. Weiss "bullet cluster"*

when two galaxy clusters pass through each other, most of the matter passes through—unlike the gas of known matter which interacts and concentrates in the center.

very different consequences for structure formation. This very new scenario had not been explored yet, and gives rise to many interesting questions.

Recently, along with collaborators (Fan, Katz, and Reece), I have been exploring a scenario in which only a fraction of the dark matter has stronger interactions. Most of it acts like dark matter is supposed to act, with very weak interactions.

However, the interacting portion can be very interesting. It can collapse into a disk and have very different signals for dark matter detection and

It's my understanding that the AMS has been conducting research about dark matter that suggests that you were right. Is that true?

M.M.

L.R.

AMS can look for antimatter in the universe, such as anti-electrons (positrons). It turns out there are more positrons at higher energies than astrophysicists had predicted based on known astrophysical

sources. So it is conjectured that this signal arises from dark matter—although in principle it could be more conventional sources that are not understood. The problem is that the signal from



The Alpha Magnetic Spectrometer, or AMS



AMS (and PAMELA) is bigger than expected from dark matter annihilation. Our dark matter would be denser since it collapsed into a disk, and could therefore give rise to a stronger signal.

If we can always find a dark opposed part, a dark matter, a dark energy, a dark photon, a dark quark... Can we think of a universe crowded by dark beings? Even a dark "me" or a "dark you"?

M.M.

L.R.

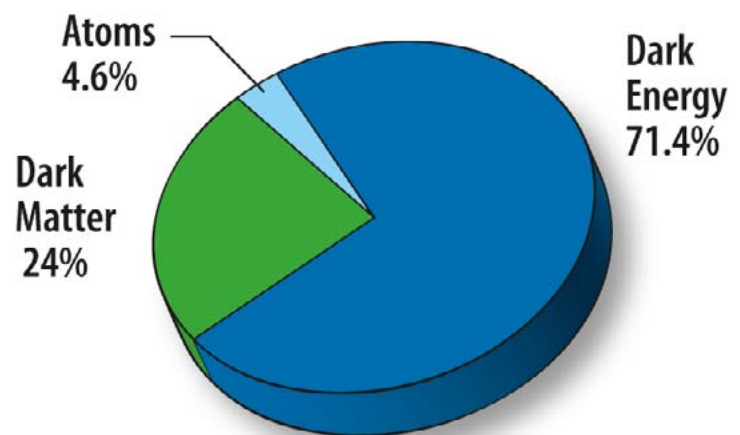
That is the interesting question. I think dark matter if it has interactions can in principle form other structures—maybe even dark atoms and dark life. They would be different from ours—the forces are after all different—but could in principle have interesting structure

and consequences too. Our role as scientists is to explore these possibilities and hopefully find ways to test them. We don't yet know what is true but it is certainly interesting to find out.

Dark matter remains one of physics' missing puzzle pieces. Only about 4% of the universe is made up of "normal" matter. Do we live in a universe that is not 100% full?

L.R.

I'm not sure what a full universe would be! Clearly there is a lot of empty space in the universe—on the whole it is not very dense and the temperature is very low. One definition of 100 % full as you say would be that the universe contains critical density—the density in which it is flat. That does indeed seem to be the case.



What about the dark energy?

L.R.

The dark energy is truly mysterious—more mysterious than dark matter in my opinion. It is energy that is spread throughout the universe but is not carried by matter. It doesn't clump under gravita-

tional influence. Instead it drives an acceleration of the expansion of the universe.

It is not surprising in some sense that such energy should exist—it is completely allowed.



However we don't know why the amount of energy is what it is. Quantum mechanics would have

indicated it was far larger. So understanding the amount of energy is a significant problem for physics.

M.M.

If the dark energy is related to the volume of the universe and the volume of the universe is expanding due to this dark energy, doesn't this imply that something is being created from nothing?

L.R.

It seems that way but the gravitational field carries negative energy so energy is conserved in the end.

M.M.

The ancient Greek philosophers tried to solve the question about the origin of things from a philosophic point of view. Parmenides said that nothing emerges from the "nothingness". The idea of "nothingness" seems to me very similar to the idea of emptiness... Do you think about the very, very first origin of everything?

L.R.

I try not to since it's a question we are not very likely to make progress on. It's interesting though—the Greeks thought of order emerging from chaos, which is probably more like what physicists imagine.



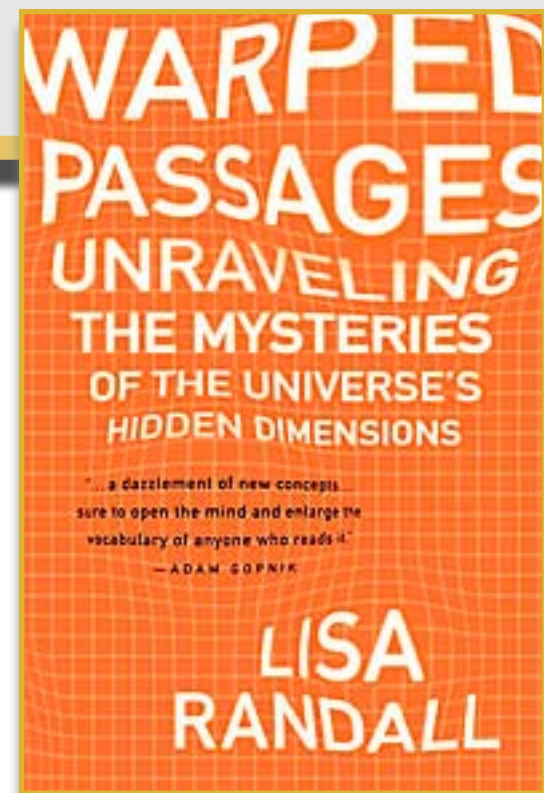
M.M.

For many years you have been trying to develop and give consistence to your theory of a hidden universe or additional universes. What does this consist of?

L.R.

Raman Sundrum and I proposed an extra dimension of the universe (beyond the three we see) that is bounded by objects called branes—three-dimensional structures ending a fourth dimension. Particles we know of as well as us and our universe might be trapped on such

a three-dimensional brane, even though another dimension exists. I explain this in much more detail in Warped Passages.



M.M.

Are we trapped in a tridimensional human jail?

L.R.

It's certainly possible and so far the evidence is that this is the case. That's why further experiments are

important—to find out the answer to this and other questions.

M.M.

Is not being able to see these dimensions a question of anatomical lack of perception or a question of the physical world we live in?

L.R.

That is an excellent question and we can't yet answer. But it is cer-

tainly possible that another dimension exists that we haven't yet



seen. In my book I tell about ways we might determine if another

dimension exists in reality and how it can be hidden.

If we can't see these hidden universes, how can we prove that they exist?

M.M.

L.R.

If they exist, particles can travel in an extra dimension. That would make it look to us like there are particles with interactions like the ones we know but that appear to us

as heavy particles. The reason for that is that they carry momentum in another dimension. We don't see that dimension so the momentum appears to us as mass.

I know that you and your colleagues pointed to the Large Hadron Collider with the hope of detecting particles with prints from other dimensions. Have you already found the evidence or are you waiting for the LHC to increase its energy?

M.M.

L.R.

We are waiting for the LHC to increase its energy.

Will it be enough energy?

M.M.

L.R.

If we are lucky it will be—it's certainly a possibility. But I do fear that the energy might be too low. The Superconducting Supercollider

that was proposed in the U.S. and was even started to be built would have had almost three times the energy and would have been a better machine for this purpose.

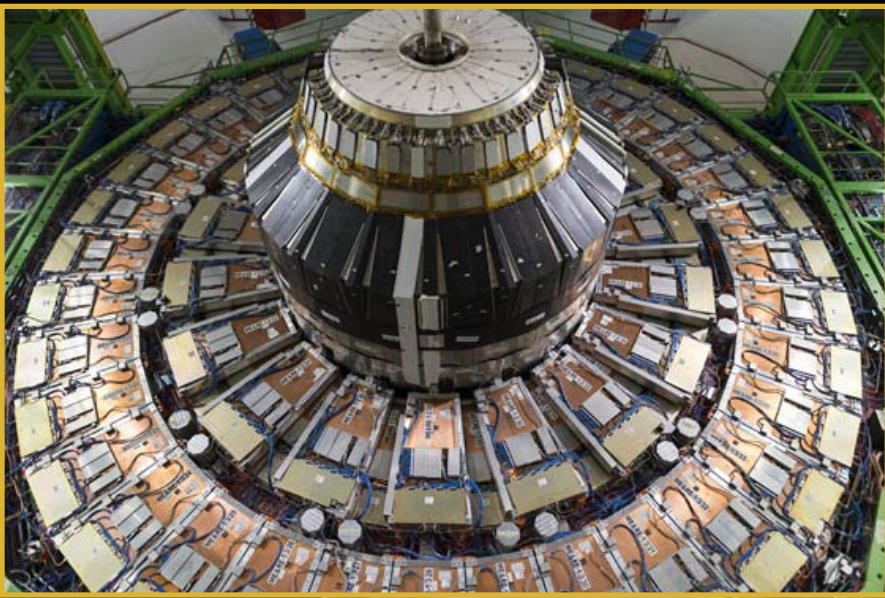


Photo:CERN

M.M.

Regarding the energy of the LHC... Is there a maximum that you shouldn't surpass or is everything allowed? Is there any risk to Humankind in "playing God" - like Otto Rossler suggested - or are the dangers zero?

L.R.

We are nowhere such a limit.  
In fact quite the opposite—that is

why it is so difficult to see new phenomena.

M.M.

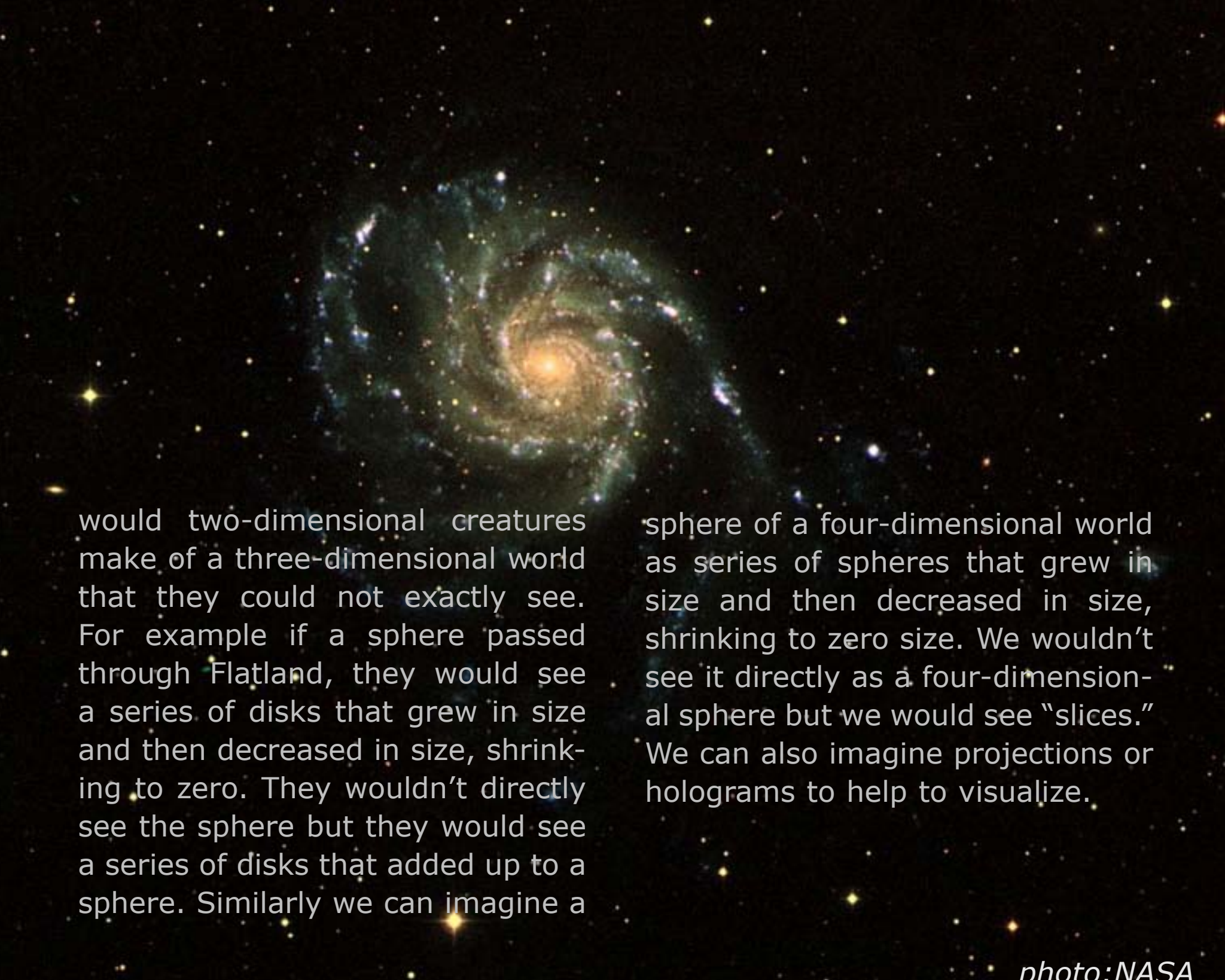
How can we imagine these hidden universes or dimensions?

L.R.

We can imagine them in a variety of ways—again described in

Warped Passages. One way is described asks the question what





would two-dimensional creatures make of a three-dimensional world that they could not exactly see. For example if a sphere passed through Flatland, they would see a series of disks that grew in size and then decreased in size, shrinking to zero. They wouldn't directly see the sphere but they would see a series of disks that added up to a sphere. Similarly we can imagine a

sphere of a four-dimensional world as series of spheres that grew in size and then decreased in size, shrinking to zero size. We wouldn't see it directly as a four-dimensional sphere but we would see "slices." We can also imagine projections or holograms to help to visualize.

*photo:NASA*

M.M.

Where are these dimensions exactly? Here with us, inside us, surpassing us, outside the Earth...?

L.R.

Dimensions are in some sense an abstract thing describing space. The number of dimensions is the number of quantities you have to specify to locate an object. If there are three dimensions, we would need three—longitude, latitude, and alti-

tude. If there are more dimensions we would need more.

So yes dimensions are everywhere. They are part of our description of space.

M.M.

Do you have an intuition, an idea of what consciousness can be?

L.R.

I do not. It is clearly some higher level interaction that is hard to

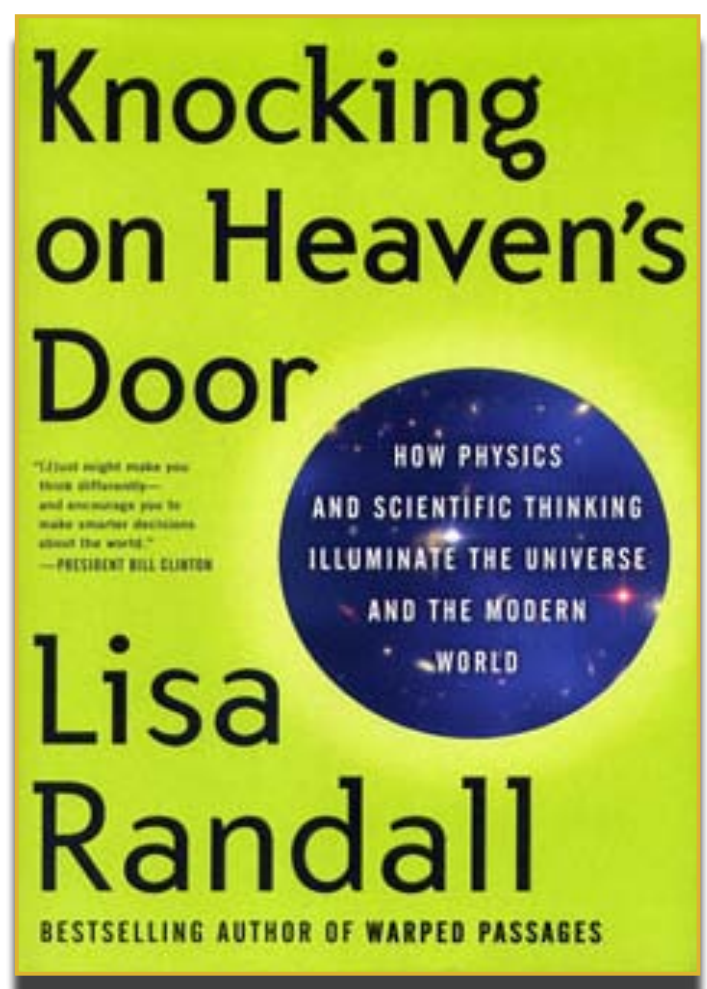
understand one neuron at a time.

M.M.

In your books, especially in *Warped Passages* and *Knocking on Heaven's Door*, you show the wonderful ability of explaining the most complicated mysteries of physics to the general public. How do you do it?

L.R.

Thank you. It is hard work in fact. I enjoy challenges and I respect my readers. If they want to understand something they are entitled to and it is up to me to break it down in an understandable (and hopefully interesting and entertaining) way. I view it as a creative challenge in fact and I also give it to lots of patient people who have read earlier less finished versions. By the way, those are my only two books, aside from a short ebook about the Higgs boson!







M.M.

The truth is that when I read your books I can't avoid feeling that I know more not only about physics but about myself... Is this the feeling that you have with physics?

L.R.

Not really but I have no problem if you do!

M.M.

In your books, you give clues to enlighten humankind about this reality that we live in the universe, and reading them is like reading about magic and fantasy, but it's not fantasy, it's true, it's physics! ...

L.R.

Glad you agree.

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*According to the latest figures around one million people a year are committing suicide, and that doesn't include the number of people who try but fail to take their own life. Health professionals, now more than ever, are looking into the causes and mentality of those who commit suicide in an effort to outline new, more effective preventative measures. Can a more psychological approach to prevention yield more conclusive results and better treatment options?*



# THE IMPORTANCE OF PSYCHOLOGICAL FACTORS IN SUICIDE MOTIVATION

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BY

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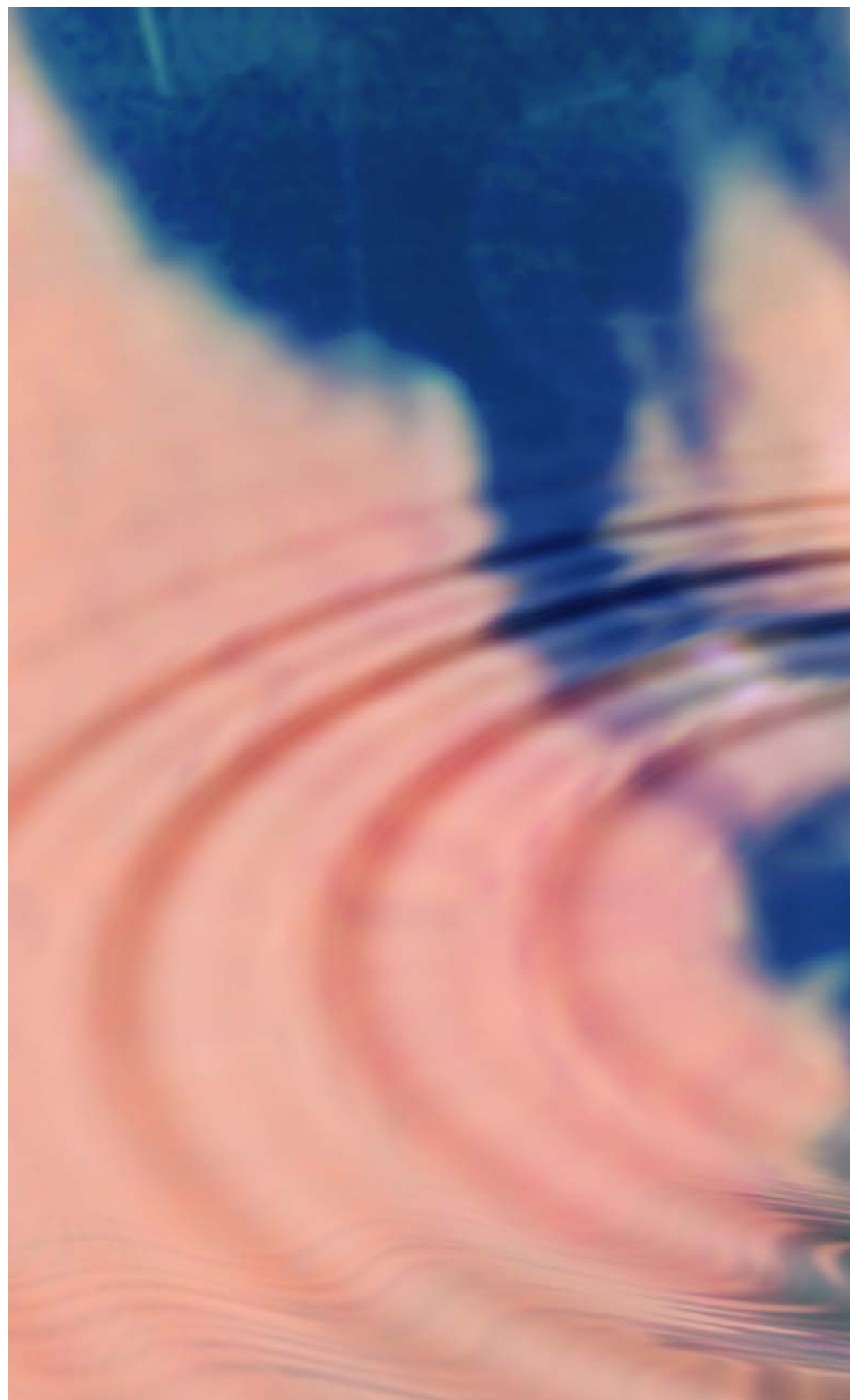
It is important to distinguish between the risk factors, which increase the chances of suicide, and the motivational factors, which are the actual cause of the persons suicidal actions. Psychological, environmental and social factors are commonly associated with suicide. Often a combination of these three serves to increase the risk factor of the individual and statistics show more than 90% of people who die have these risk factors.

There is far more information on risk

factors than motivational causes, and many of the suicide prevention websites, information boards and helplines, although mentioning that these are not actual causes, have no information on possible motivations. Could this actually be misleading and causing health professionals and prevention centres to focus on risk factors rather than the motivation behind the suicide attempt? If a schizophrenic, whose family have a history of suicide, attempts to take his own life, is the motivation for it simply classified

as due to his mental illness and family history? If this is the case then there is a black hole regarding individual motivations. Yes, these are risk factors, but is there a universal linking cause in the motivations of those who attempt suicide?

The danger of ignoring this is that those who are in a position to help, such as the family or the community, are being made aware of the risk factors and can reduce them, but they cannot tackle the motivations of the suicidal person. **If risk factors are mistakenly identified as the sole cause then treatment will naturally focus on reducing or negating the effect of these risk factors, neglecting any treatment that could help tackle the motivation behind the actions.** The National Suicide Prevention Helpline website includes a list of risk factors and states that these are only warning signs and not the causes, but there are no guidelines there on the cause or motivation behind the actions.



If research could find a common motivational cause then this would benefit greatly those who wish to

*Current motivational factors commonly include a cry for help, economic and financial pressures and impulsivity.*





help and understand those at risk. Current motivational factors commonly include a cry for help, economic and financial pressures and impulsivity. However, there is no great amount of research into this area and there is no linking cause that has been discovered between suicide motivations.

But now a breakthrough study by the University of British Columbia

has highlighted universal motivational factors and has developed the first scientifically tested measure for evaluating suicide motivation. Their goal was to advance the approach to suicide prevention beyond the common risk factors and push towards a more focused treatment based on motivation.

The 120 participants had all attempted suicide in the last three years and had demonstrated that their actions were carried out with an intent to die.

Participants completed questionnaires containing questions on 10 different motivations for their suicide attempt and a detailed analysis was carried out to provide valid

results.

The findings showed that the most important motivational factors are relatively uncommon. The two main universal motivations across all the participants were hopelessness and an overwhelming emotional pain. These internal psychological factors are entirely different from the more common motivational factors that are more externally focused such as

---

a solution to an economic strife or escape from a problem in their lives. What is so astonishing is that the two universal motivations were present in all participants, and that these two motivations are very much psychological issues. If current preventative actions and treatments are being established based on the more common, external or cry for help models, then there is going to be a huge problem in their effectiveness.

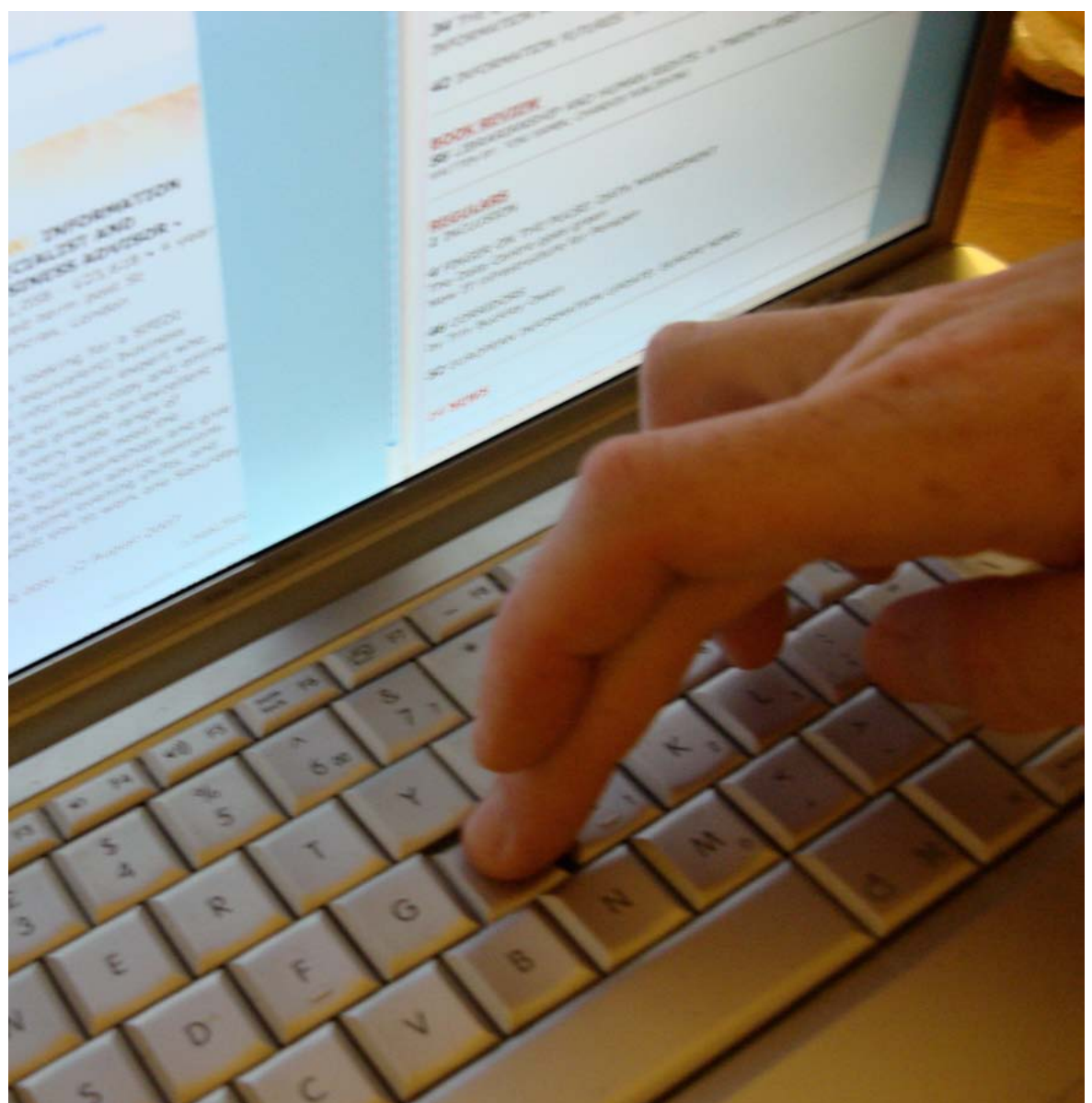
By focusing more on the psychological motivations a new therapy and treatment process can be drawn up. The questionnaire is now available for clinical use and is one step in the right direction. If more and more patients can be assessed using the questionnaire and the same universal psychological motivations are found then gradually a change of thought can take place in regard to the

motivations of those who attempt suicide. If the prevention organizations and health professionals are exposed to this information they can implement a drop down change in the way family members, patients themselves and the community view suicide motivation.

Even by having some small amount of infor-

mation on the helplines or websites can better inform people of the pain and suffering their loved one is going through and help them realise that it is the internal factors that need to be focused on and understood, rather than solely the external factors.

But can a questionnaire and a detailed analy-





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sis really be a reliable measure of a person's suicidal motivations?

Researchers at the University of British Columbia used the The Inventory of Motivations for Suicide Attempts (IMSA) and claimed it to be the first scientifically tested and most accurate tool of measuring motivations in suicide.

The IMSA was specifically designed to evaluate comprehensively the major motivational theories associated with suicide. It is certainly the most up to date model and has improved on past questionnaires by using the ten most common suicidal motivations, be they external or

internal, as its basis. However, more experiments need to be done using the IMSA to show just how valid the results are. As in any relatively new measurement technique only over

time and with practical applications can its reliability be thoroughly tested.

Many will question how reliable any questionnaire is in regard to this topic, especially when high emotions are involved, can a questionnaire really provide reliable answers?

Throughout the past thirty years many of the experiments and research into suicide have used questionnaires as an effective way of grading suicide factors and assessing motivations, and the questionnaire remains the most common way of assessing suicidal factors and motivations.

However limited a questionnaire may be it seems that no better alternative has yet been found.

Outside of the profession many people view suicide as an escape from external factors and not always as a psychological problem.





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In November 2012 Reuters reported the suicide rate of Americans was up during the financial crisis. Suicide rates between 2008 and 2010 quadrupled in comparison to the rates between 1999 and 2007.

Some of the factors reported for this included unemployment and the recession, but no great emphasis was given to the internal psychological suffering and hopelessness these factors caused.

This study is very important not just for suicide prevention but also for expanding the knowledge of the general public on a topic of which people tend to shy away from discussing or

even attempting to understand. If these two universal factors, hopelessness and internal suffering, can be shown to the public then maybe people will change their attitudes towards those who attempt suicide and with this understanding be able to help them, building up a greater source of help. This counts tenfold for family members, who may simply not accept the reasons their relative gives for a failed suicide bid and be blind to their reasons. But if there is accessible advice and explanations available it could open their eyes to the suffering of a loved one and enable them to accept the reasons for their actions.



Suicide is a global problem with the numbers highlighting just how serious the problem is. In France alone suicide counts for 2% of all the deaths in a year. In the United States teen suicide is the third leading cause of death for young people aged 15 - 24.



The universal factors of hopelessness and overwhelming emotional pain that have been exposed in the study can hopefully start a new treatment process and introduce preventative measures based on a better understanding of the motivation behind the actions and save peoples lives.

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If you would like to know more the Journal of Suicide and Life Threatening Behaviour contains many reports on the subject, including the one mentioned in this article. Suicidology Online is also an excellent open resource with many free to access essays and research.

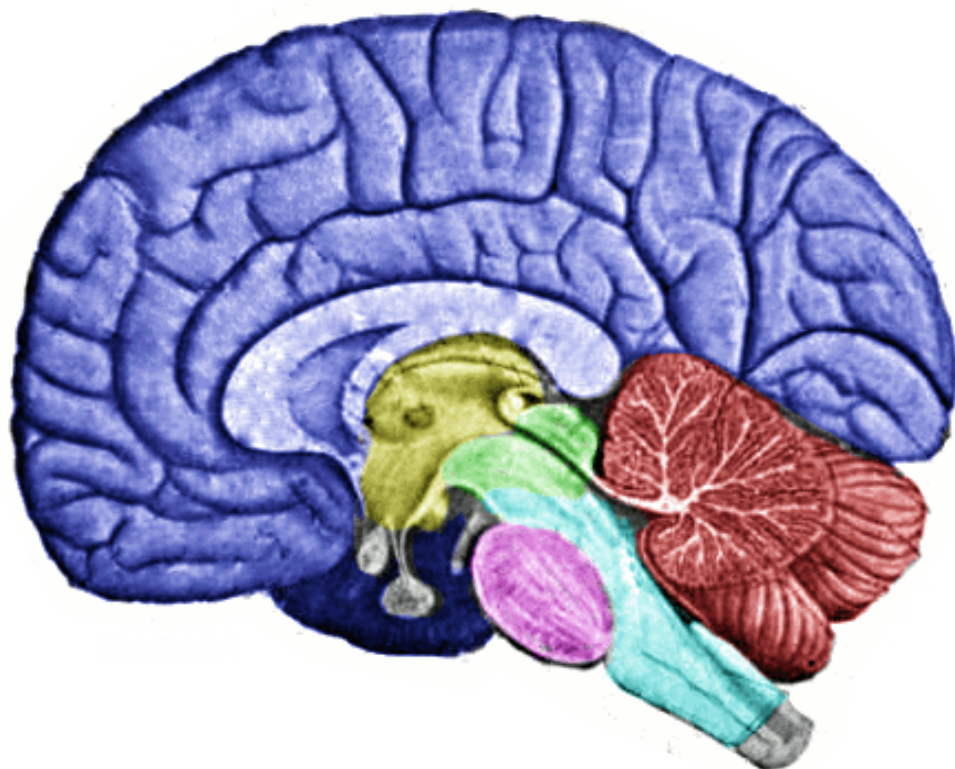
# KEEPING YOUR BRAIN HEALTHY

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## WHEN IT COMES TO HEALTH, THE BRAIN SHOULD GET TOP CONSIDERATION



*Why?*

*The brain is the leader of the symphony. All else depends on the optimal functioning of the brain. To focus on other things first is to put the cart before the horse. If the brain isn't functioning correctly it is impossible to have everything else in the body operating at its best. If the brain is thriving, you thrive. The reverse is also true. If the body is suffering, the brain will be the first to also suffer.*

**T**he brain is no different than any other part of the body in that it needs certain ingredients to thrive. The brain is the most metabolically active organ in the body so it is very sensitive to getting its needs met to function optimally. The two main requirements for the brain are oxygen and glucose. 20% of all our oxygen is used by the brain.



Anything that increases oxygen delivery to the brain is good. Of course the reverse is also true.

4.

themselves

No refined  
sugars



Diet has a major role to play in both oxygen and glucose delivery to the brain, but particularly glucose. The brain requires a steady supply of glucose and that is best accomplished with a whole food diet devoid of refined carbohydrates. If the glucose supply is erratic due to poor choices, ones emotions usually are on a roller coaster and their life is full of chaos. A few rules for eating for the brain.

5.

No eating  
after dinner

Processed foods, even proteins, can leech valuable nutrients from the body. Mostly these are the same nutrients that have been removed from the food during processing. These foods can also have the effect of spiking blood sugar contributing to an unstable supply to the brain.



1.

Eat whole  
foods

Sugar is a major problem. With over 150 pounds consumed per person in the U.S. (100 years ago it was 4 pounds) and rising, it contributes to many health problems like diabetes, heart disease, obesity, etc. There is a correlation between diet and behavior as well. Diet affects the

part of the brain first that deals with learning, social skills, and civilized behavior. This part of the brain gets starved with a bad diet. S When people are stressed there are two ways to deal with it. One is a civilized response and the other is not. Diet can be the main factor which dictates the choice that

2.

Eat complex  
carbohydrates  
only

3.

No carbo-  
hydrates by



predominates.

There have been studies done where probationers were put on whole food diets as a condition of their probation. Very few were repeat offenders. Conversely, there was a over a 70% recidivism rate amongst the probation population that didn't make any dietary changes. It's a shame that this information has gone

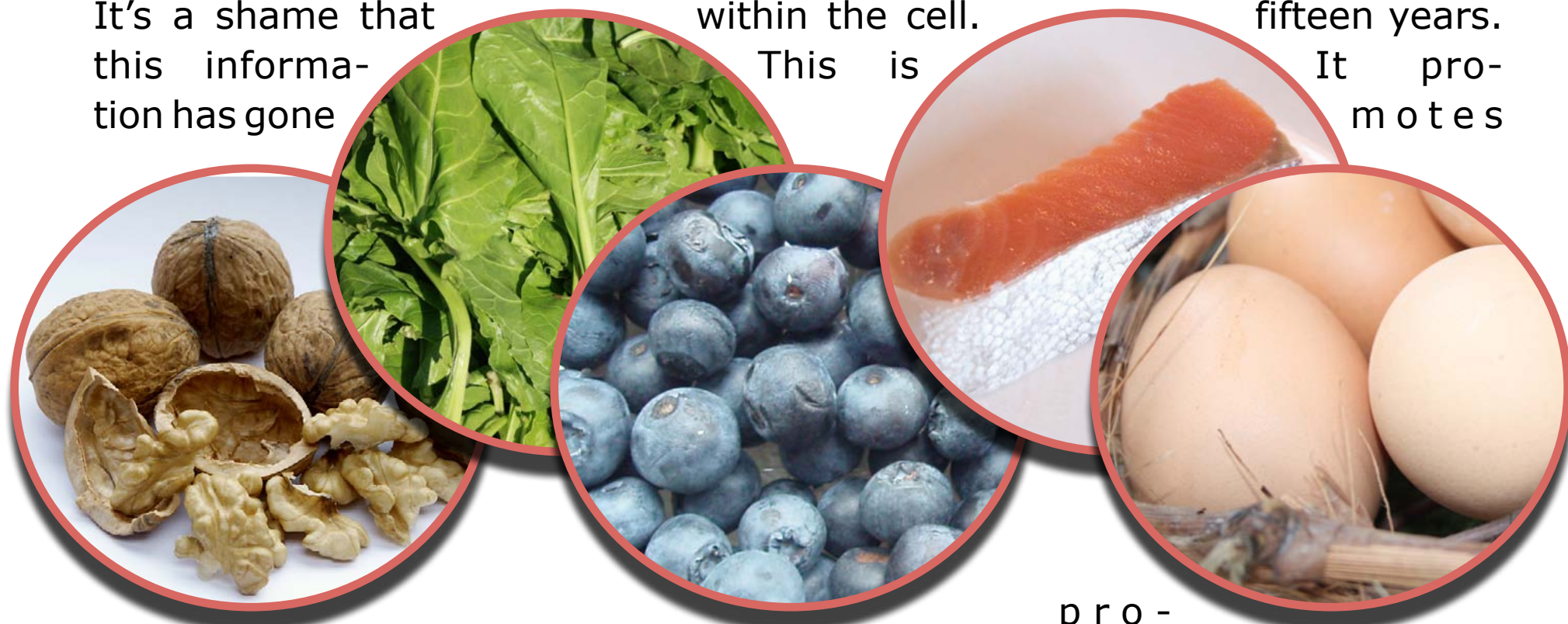
artificial sweeteners and food colors and flavors. It is also best to avoid fluoride. One side effect of fluoride is the lowering of one's IQ.

Exercise is mandatory for good brain health. Besides enhancing circulation, exercise actually increases the number of mitochondria within the cell.

This is

benefits of exercise are an increase in decision making reaction time, improved self esteem and moods, a decrease in stress, a slowing of the aging process and better sleep. X-ray scans have proven that exercise increases circulation to the brain. It also can push back cognitive decline ten to fifteen years.

It promotes



ignored.

Some good foods to feed the brain are blueberries, Alaskan salmon, walnuts, spinach, and organic eggs. It is best to avoid hydrogenated fats, deli meats, corn and soy oil, MSG,

where energy is made so more is better.

The number one complaint of people today is fatigue. Fatigue starts in the brain.

A lack of exercise is a very common cause of depleted energy. Other

production of nerve pathway protection and improves neuron development and decreases cellular deterioration.

Easy, prolonged exercise that you enjoy doing is best. Walking, cycling or whatever you

## *Exercise is mandatory for good brain health*

enjoy is ok.

The key is con-

sistency. It is best

not to over exert yourself, especially when first starting out. That could

lead to rapid burn out or injury.

The goal is to burn fat for energy and that is done with slower pro-

longed exercise. If you find yourself gasping for air or you cannot carry

on a conversation

while exercising,

you are probably

burning sugar, not

fat, for energy.

Exercise can add

as much as two

hours of produc-

tive time per day.

The challenge is to

start. Commit to

five minutes a day

the first week and build on that. If

you are already exercising, add five

minutes to your routine.

In addition to the bad food items previously mentioned, other ene-

mies of the brain are toxicity and

inflammation. I put them together

because toxicity can be a cause

of inflammation. Inflammation is

caused by free radical production in

the brain. Free radicals are unsta-

ble electrons that create heat which

damages surrounding tissue. In the

brain the fat cells are affected. The

brain is 60% fat so there is a lot of

potential for problems here. Rancid

fats and oils are a major concern but

so is the exposure to certain chemi-

cals. Pesticides, insecticides, MSG,

cleaning agents, etc. can be danger-

ous. Combining an exposure to these

common toxins in

the absence of ade-

quate antioxidants

can have negative

consequences. It is

known that spraying

insecticides inside

your home increas-

es your risk of

Parkinson's Disease

by 70%. Spraying

outside your home

also raises the risk factor but not

quite as much. Many medications

decrease the body's antioxidant

reserves as well. If you're tak-

ing prescriptions, I'm not suggest-

ing you stop. However, do a little

research and if they lower your anti-

oxidants, simply start supplement-

ing with them.

Alzheimer's and Parkinson's are on

the rise at alarming rates. 10%

of the U.S. population at age 65

has Alzheimer's. By 2030, eight





---

million Americans will have this debilitating disease. The statistics for Parkinson's are as grim. As I write this one in fifty children are diagnosed as autistic. 14% of school age children are diagnosed with Attention Deficit Disorder. Depression, anxiety, and obsessive compulsive disorders account for a large part of the prescription drug market and growing exponentially.

There are some valuable lab tests that can provide useful data. Here's a few:

1.

**Oxidative Stress Test.**

This test provides an accurate marker for free radical activity in fatty tissue. Remember, the brain is 60% fat. This test measures the degree of free radical assault that is taking place and also the antioxidant defense status of the individual.

2.

**Homocysteine.**

This is a normal byproduct of the breakdown of the amino acid methionine. The body should neutralize it quickly but if not, it can build up

and create inflammation, especially in the arteries. High levels are a risk factor for Alzheimer's. If homocysteine is high in the brain, it can contribute to depression, stroke, and cancer. Certain nutrients are needed to neutralize homocysteine like Vitamins B6, B12, folic acid and magnesium. Drugs are not the solution here.

3.

**C-Reactive Protein.** This has long been known as a cardiovascular risk factor but it can also be indicative of brain inflammation.

4.

**Glutathione.**

One of the best markers for health. It is a powerful cellular antioxidant. Generally, the higher the levels, the healthier one is. There are precursors to glutathione. One is lipoic acid. Another N-acetyl cysteine. There are two enzymatic processes that synthesize glutathione. One is selenium dependent and the other is riboflavin dependent.

To keep the toxic load from accumulating in the brain it is important to aid the functioning of the liver. What the body can't eliminate it will store, even in the brain. One of the main functions of the liver is to filter out toxins and turn them into a form that the body can eliminate. N-acetyl cysteine and lipoic acid are very good liver supports, but there are many other supplements that help as well.

Milk thistle, dandelion, celery and safflower are a few herbs that aid the liver. Foods that help are broccoli, brussel sprouts, carrots, lemons and limes.



There are several supplements that can support the brain. Here's a few:

1.

**Coenzyme Q10.**

A necessary nutrient for energy production and is also an antioxidant and enhances the immune system.

4.

**Resveratrol.**

A potent antioxidant and helps oxygenate the brain. Decreases neurodegeneration and increases the development of new nerve pathways.

2.

**Acetyl L-carnitine.**

Helps with cellular detoxification and heals nerves.

5.

**Grape seed extract.**

Helps injuries heal. A potent antioxidant and increases brain glutathione.

3.

**Phosphatidylserine.**

Promotes healthy cell membranes, improves memory and increases the neurotransmitter acetylcholine.

6.

**B vitamins.**

B6, B3, and B12 are all good for the brain and nerves. B3 has shown promise aiding Alzheimer's. B12 deficiency is missed a lot because the lab normal values are too low.



7.

**L-carnosine.**

Helps with nerve repair.

Increases activity in the frontal cortex and lessens stress induced damage to the brain and kidneys.

8.

**Pregnenolone.**

A natural hormone which is the precursor to all the other hormones. It can boost memory and moods. It helps with learning, reduces stress hormones, increases energy, and boosts immunity.

9.

**Turmeric.**

A great anti-inflammatory. Has been shown to be effective at lowering C-reactive protein.

Beyond foods and nutrients, there are other lifestyle components necessary for the brain to thrive.

Here are some important ones:

1.

Movement with focus.

Doing things automatically and routinely does not stimulate the brain. Focus promotes the growth of new nerve pathways. Doing movement slowly with focus is even more powerful.

2.

Learning new things is rocket fuel for the brain.

Taking classes, visiting new places, learning new recipes, etc. forms new brain patterns which equates to an increased sense of aliveness.

3.

Gentleness increases our vitality,

awareness,

and sensitivity. Force does the opposite.

4.

Have fun.

A childlike playful attitude is good for our brains.

5.

Take drugs only when necessary.

Cognitive decline can be a side effect of drugs.





6.

Get enough rest.

In the U.S. forty million people suffer from a sleep disorder. They also work longer and take less time off than the rest of the industrialized world. Fatigue can have a similar effect on the brain as alcohol.

7.

Control your stress. Stress increases free radical production which causes inflammation. It causes an increase in stress hormones that are toxic to our memory center of the brain and also decreases the production of neurotransmitters which are necessary for cellular communication.

8.

Do something you love for your work. If that is not possible right now, do something you love while you do your work (like singing).

9.

Surround yourself with beautiful music, colors, smells, and other things that delight you. This makes you feel good and the brain loves it. Where you spend most of your time should be heaven to your senses.





10.

Do new, different things regularly. Most people do the same things daily. They eat the same ten foods, watch the same television shows, drive the same routes, etc. Habitual living is a death sentence to the brain. Living with awareness and trying new things is invigorating to the brain.



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The first symptom that the brain is struggling is usually the inability to retrieve information. Along with the suggestions already mentioned, the brain can be exercised specifically. Here's one way to do that. In the morning pull one card out from the deck and look at it. In the evening before retiring recall what the card was. If this can be done successfully six days out of seven, then repeat by pulling two cards out in the morning. Again, recalling successfully six days out of seven add another card. When this can be done with six cards start adding a first name and eventually a last name.



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This exercise also makes one focus and provides a quantifying measure of how severe the problem is. My suggestion is if this is really difficult get the lab tests mentioned earlier done and start supplementing with some of the nutrients. You can improve the results just like you were rehabbing any other part of the body. Remember, the brain is dynamic, metabolically alive, and can lay down new neuronal pathways at any age as long as the appropriate stimuli is applied.

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# EFFECTS OF EXPOSURE TO ELECTROMAGNETIC FIELDS FROM COMPUTER MONITORS ON THE CORONA DISCHARGE FROM SKIN

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## ABSTRACT

Experimentation in humans indicates that electromagnetic fields (EMF) have detrimental effects. EMF have been reported to induce a wide variety of adverse clinical effects which include: adverse reproductive outcomes, neuro-degenerative diseases, headaches, depression, sleep disorder and fatigue. These effects have been validated by large-scale, double blind clinical studies and clearly indicate that a variety of detrimental effects can occur in humans exposed to EMF from man-made technology. Exposure of human skin to EMF provokes different effects with large individual variability. In order to analyze the effect of electric and magnetic fields on human



channels is recorded using a charge coupled optical system, digitized using a video-blaster and mathematically analyzed for several linear and non-linear parameters including area, fractality and entropy.

GDV images of each of ten fingers were obtained from cohorts of volunteers before and after a ten-minute exposure to EM fields generated by computer monitors. The results seem to indicate that two populations exist, one of which is prone to undergo remarkable changes of skin-surface electric properties, whereas the other seems to maintain unchanged properties in the conditions of the experiment (short exposures). Overall significance was determined using statistical analysis (t-test). Topical application to the face of a cream specially prepared to shield EMF hemmed the

skin a new technology called Gas Discharge Visualization is being developed.

Gas Discharge Visualization (GDV) generates gas discharge images of the air gap around the skin in response to a train of triangular

electrical pulses (0.1 second duration, 1000 Hz, 3kV and 106 V/s). The electric field initiates electron-ion avalanches, which result in a gas discharge along the dielectric surface. The spatial distribution of discharge



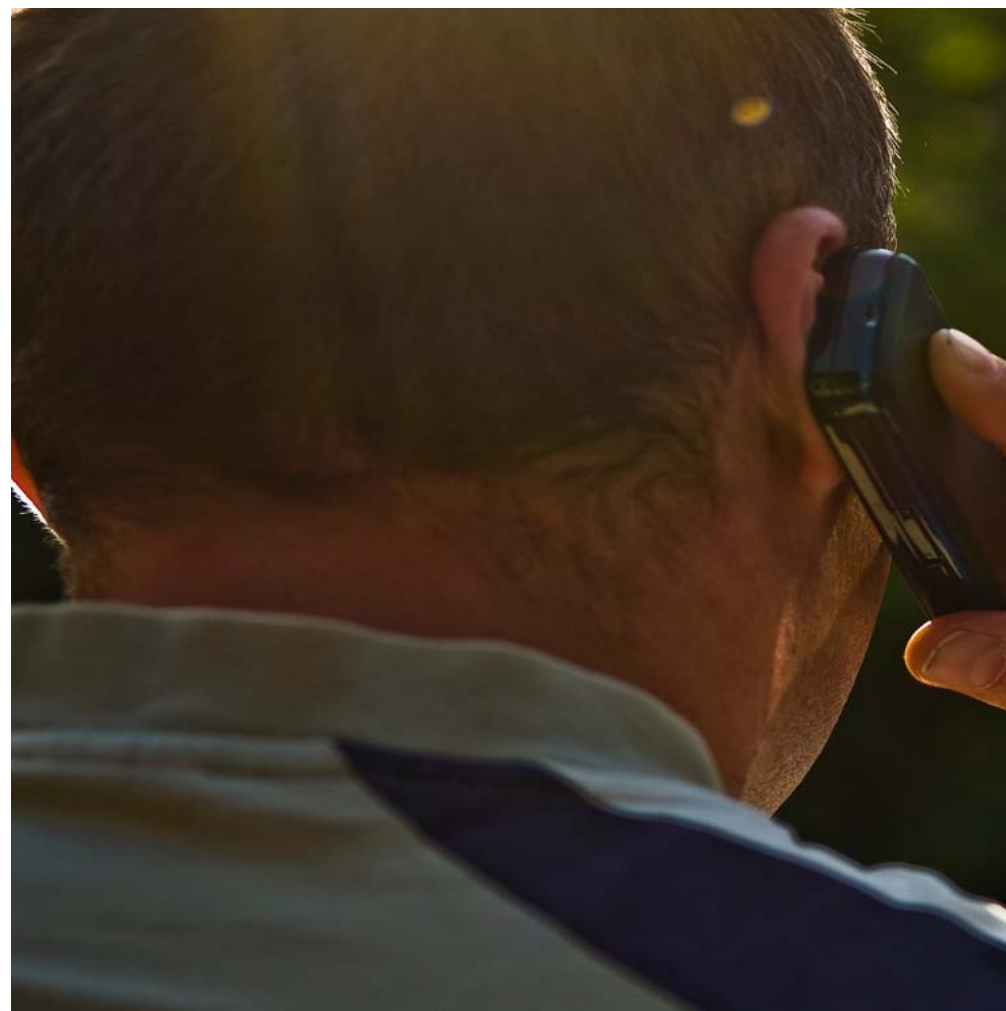
modifications induced by EMF for most of the volunteers exposed to the EMF from a computer monitor irrespective of age and gender. This indicates that topical application of specific materials can protect the skin against the adverse effects of EMF

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## INTRODUCTION

Laymen and scientists are becoming increasingly concerned by the effect of electro-magnetic fields [EMF] originating from man-made devices such as Video Display Units (VDU) of computers or televisions, cellular telephones, electric wires and overhead power lines [1]. EMF originating from VDU of computers have been extensively studied by the Bio-electromagnetic community. As an example, see for instance reference [2].

From epidemiological observations it can be gathered that people working with computers develop the so-called "screen dermatitis", characterized by rosacea-like symptoms such as itch, heat sensation, pain, erythema, papules and pustules.



People affected by "screen dermatitis" present with specific histological features, such as high numbers of histamine-positive mast cells and somatostatin-positive dendritic cells, even before the exposure to the radiation from the screen [3, 4]. This is to say that the general population comprises people prone to react heavily to the exposure to VDU with immune responses and with the release of histamine. Microwaves in the range of frequencies used for cellular phones have been shown to increase chromosomal aberrations in cultured V79 cells [5] and in human lymphocytes [6], and to increase the release of histamine from mast cells [7].

In rats exposed to these microwaves, there is an increase in the number of benzodiazepine recep-



tors [8], which are responsive to anxiety and stress. Neural transmission also is affected by microwaves, since it has been shown that cholinergic activity decreases in rats exposed to microwaves, and all the three opioid receptor subtypes are involved in the phenomenon [9]. These results, extrapolated to man, could account for the headaches and other diseases found to be associated with the use of cell phones.

50-60 Hz EMFs have several biological effects. Among them one finds the capability to affect intracellular Calcium transport and induce Calcium oscillations in cultured cells [10]. It can thus be expected that these EMFs interfere with Calcium-induced differentiation of keratinocytes and also that, by mod-

ulating Calcium activity, they might provoke cellular necrosis and the consequent inflammation.

For the immediate relevance to human well being, it appears that the EMF above share as a common feature, the capability to trigger the release of histamine, and thus to provoke itch, redness, pain, papulae and pustules. There are reports, which suggest that EMF might affect the mental well being by interfering with the proper functioning of neural physiology and thus provoke headaches, migraines, anxiety and stress.

Human skin is a very complex organ and a same cause, such as the exposure to EMF, might have in different individuals, consequences of different extent. The clinical observations could in some instances be elusive and the clinical relevance of phenomena resulting upon exposure to EMF might be difficult to assess. It is therefore necessary to identify a parameter of the skin, which could be used as endpoint when exposing humans to electromagnetic fields.

This chapter describes a methodology to acquire information on the electric properties of the surface of the skin by analyzing the



glow discharge generated when the skin is subjected to trains of triangular electric pulses. These properties are modified when the skin is exposed to EMF generated by computer screens.

Materials able to shield EMF from VDU and 50-60 Hz are at hand: these frequencies are the most likely to be perceived as skin damaging, and these materials are advantageously used in skin care products claiming the capability to shield these EMFs. After topical application of creams able to shield or dampen the intensity of electromagnetic radiation, the electric properties of the surface of the skin are less prone to undergo the modifications induced by the exposure to electromagnetic fields.

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## MATERIALS AND METHODS

### **Principles of the experimentation**

GDV Technique allows the monitoring of individual reactions to different treatments [11,12,13]. The experiments were performed with healthy volunteers from 18 to 40 years old.

Control measurements (before exposure to EMF) were taken when subjects had remained in a computer-free environment for at least 20 minutes. The computer monitor used for measuring changes in GDV was a standard electron-beam tube computer monitor with 17" screen. Control measurements with computer turned on and off without turn on the monitor demon-

strated that the GDV signal was constant for volunteers not exposed to EMF.

### **The Gas Discharge Visualization**

Measurements of individual reaction to EMF have been performed using Gas Discharge Visualization (GDV) technique [11], which generate images of the air gap around the skin during the glow discharge consequent to the stimulation of the skin with a train of triangular electrical pulses. The electric field initiates electron-ion avalanches, which result in a gas discharge along the dielectric surface. The spatial distribution of discharge channels can

be recorded using a charge coupled optical system, digitized using a video-blaster and mathematically analyzed for several linear and nonlinear parameters including area, fractality and entropy. Measurements are taken from the 10 fingers of a subject. Average basic parameters of the fingers glow patterns (BEO-grams): area, density, spectrum, entropy, and fractality can be calculated as described elsewhere [11]. The values of the parameters were calculated for the ten fingers of the left and the right hands and averaged. The GDV Camera used in these experiments was produced by Kirlionics Technologies International, Saint-Petersburg, Russia, and had the following parameters: single impulse duration 10

microseconds; repetition frequency 1000 Hz; induction interval 0,5 s; electrode voltage 3 kV.

### **Statistical processing**

Data of all measurements were processed statistically with standard software packages STATISTICS and SPSS. Different types of group data analysis: t-test, Kolmogorov-Smirnov test and Wilcoxon test demonstrated consistent results in all trials. This confirms our previous conclusion[11] that distribution of the GDV parameters for semi-uniform group of more than 20 people has quasi-Gaussian character. Parametric inter-correlations were studied with multi-parametric factor analysis.

### **EMF Protective Creams.**

Special creams for the



*GDV Camera*

protection against EMF radiation have been developed by the Estee Lauder research team. The principle of protection was to prepare oil-in-water emulsions in which the water phase contains electrolyte and magnetic particles, which oscillate when submitted to electromagnetic waves and thus absorb energy and reduce the intensity of the EMF.

The creams were a simplex control emulsion (base), a simplex emulsion containing inert powders (sham) or base added with electrolytes and magnetic particles (anti-EMF cream).



## Protocol of experimentation

Three separate populations were tested by taking GDV photographs before, 10 minutes after subjects sat in front of a computer and ten minutes later after sitting in front of a computer with various creams applied to the face. Initial measurements were taken only when the subjects had remained in a computer-free environment for at least twenty minutes. Seven subjects used the simplex emulsion with no actives (control), 13 additional subjects used the simplex emulsion containing the EM SP ceramic and 13 more subjects used the simplex emulsion containing our anti-EMF technology consisting of a mixture of granatite, fuscite and salt.

### Stage 1

1. The volunteer being examined is sitting in a comfortable position in front of the computer (turned off). GDV images of the 10 fingers are taken.
2. The Computer is turned on, after a 10 minutes interval the images of the 10 fingers are taken
3. The Computer is turned off, after



a 10 minutes interval the images of the 10 fingers are taken

### Stage 2

1. The volunteer being examined is sitting in a comfortable position in front of the computer [turned off]. GDV images of the 10 fingers are taken.
2. The Computer is turned on; after a 10 minutes interval the images of the 10 fingers are taken
3. The Computer is turned off, The Cream is applied to the face, the Computer is turned on, after a 10 minutes interval the images of the 10 fingers are taken.

*For every participant at stage 2 three sessions with different creams*

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## RESULTS

### A] Effect of EMF on the electric properties of skin surface

Different GDV signals [area and Fractality] were revealed when the volunteers were exposed to computer monitor [Table 1]. No correlation was found with age or gender. No significant effects were seen when pooling the data from all subjects.

### B] Effects of different topically applied creams on the modifications induced by EMF on the electric properties of skin surface

The results in the section above indicate that exposure to EMF Radiation emitted from computer monitors dramatically changes the electrical properties of the skin, as deter-

**Table 1. Type of reaction to the computer monitor**

GDV Area							GDV Fractality					
	pre	SD	post	SD	p	n	pre	SD	post	SD	p	n
All	5613	2677	5599	2991	NS	41	18.44	6.5	17.74	5.8	NS	41
Increase	5476	3080	6770	3246	NS	22	15.34	6.8	17.94	6.6	NS	18
Decrease	5773	2192	4243	1993	0.03	19	20.87	5.5	17.59	5.3	0.04	23

**Table 1: Effect of EMF from computer VDU on GDV area and fractality.** Pre – initial; post – 10 minutes after exposure to the computer monitor for 10 minutes; SD – standard deviation; p – statistical probability; NS – not significative; n – number of participants.

Examining before-after differences, two populations emerged, showing increases or decreases in GDV values. The magnitude of these responses varied from less than 10% to approximately 8-fold. Statistical significance was reached only in the population, which showed decreases in both GDV image area and fractality.

mined by the area and fractality of GDV images. We have explored the effect of topical applied creams on these variations. When the exposure to EMF was after topical application of a cream containing the anti-EMF technology, the values of GDV area was very similar to the values of the non exposed control. The results obtained with a cohort of volunteers are reported in figure 1 [average of the GDV areas].



Figure 1

**Figure 1:** Average GDV areas before or after exposure to EMF, or after exposure to EMF with anti-EMF cream

When another cohort of volunteers was exposed to EMF from computer screen after treatment with the base alone or with the base containing a powder of inert material, the reduction of GDV area was similar to the one observed for the untreated control. On the other hand, when exposure to EMF was after the application of a cream containing anti EMF technology, the reduction of GDV area was much smaller. The results are reported in Table 2 and the individual outcomes of the experiments are reported in figures 2 A, B and C. The data in Figure 2A indicate that following exposure to computer radiation,

nearly all [11/13] individuals using anti-EMF creams showed an increase in GDV area. This effect is clearly less pronounced in subjects using the simplex emulsion with or the simplex emulsion with a ceramic powder [Figure 2B and 2C].

The pooled data for statistical analysis is presented in Table 2, which demonstrates a significant increase [p=0.02] in GDV area following application of the anti-EMF cream [compared to after computer values].

**Figure 2:** Individual variations of the GDV area [after exposure to computer screen in the presence or in the absence of an anti-EMF cream [A]. a mock ceramic-containing cream[B] or the control simplex emulsion [C]

**Table 2 Effects of creams on EMF-induced modifications to GDV area**

	Group I: Base			Group 2: Anti-EMF			Group3: Inert Powder		
	Average	SD	p	Average	SD	p	Average	SD	p
Initial	7212	2654		6232	3422		7705	2070	
Computer	6747	2364	ns	5011	2565	ns	7067	1820	ns
Comp + Cream	8060	2123	ns	7203	1687	.02	8070	1713	ns

**Table 2** Average values of GDV areas for the three groups exposed to EMF

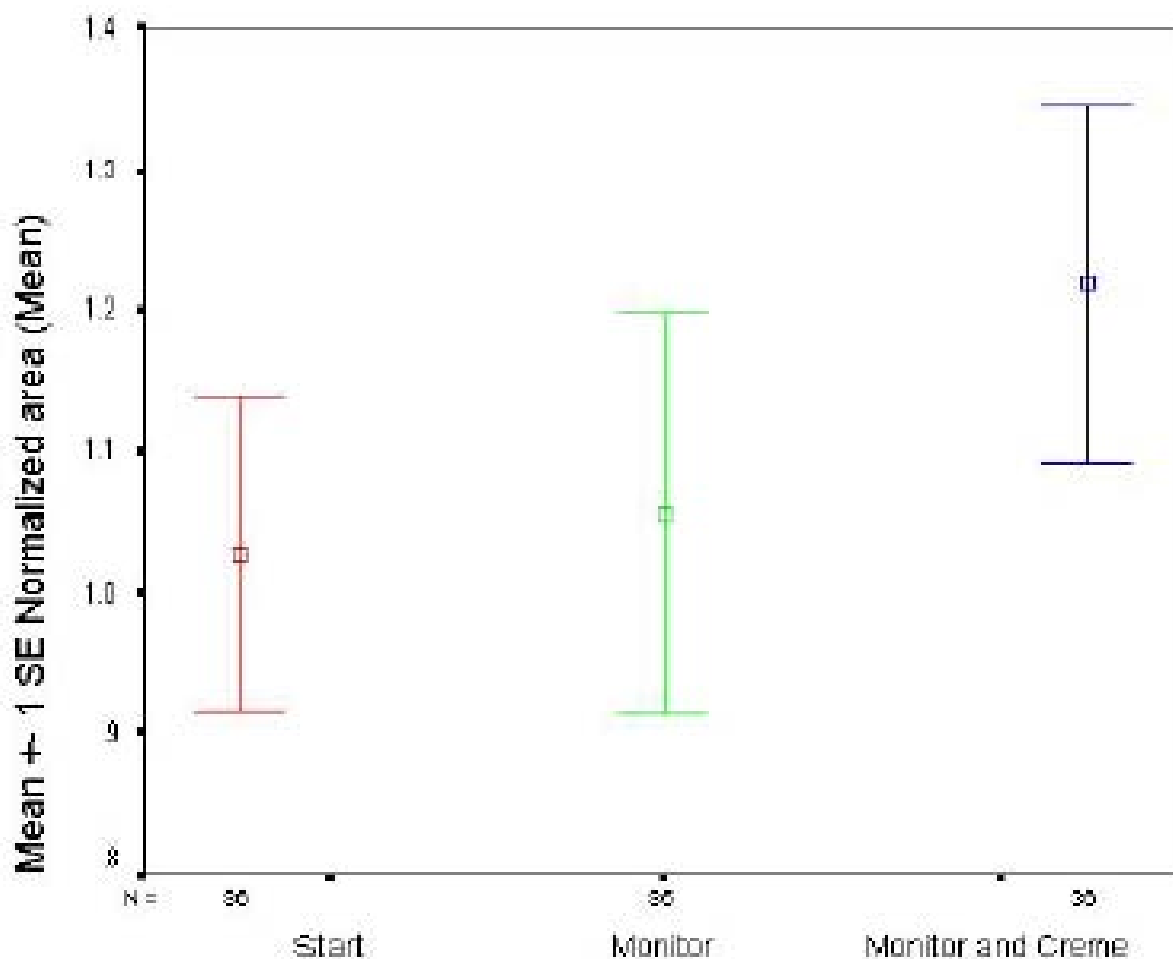
## Figure 3

**Figure 3:** Individual effect of exposure to EMF in the presence or in the absence of control cream, cream with ceramic powder or anti-EMF ingredients

The data in Figure 3 show the effect of exposure to computer radiation with or without topical application of specific creams. Large inter-subject variations are observed, yet the overall trend is a decrease in area following the exposure to computer-emitted EMF and an increase when the exposure is subsequent to a treatment with anti-EMF creams. Control studies with the computer on and the moni-

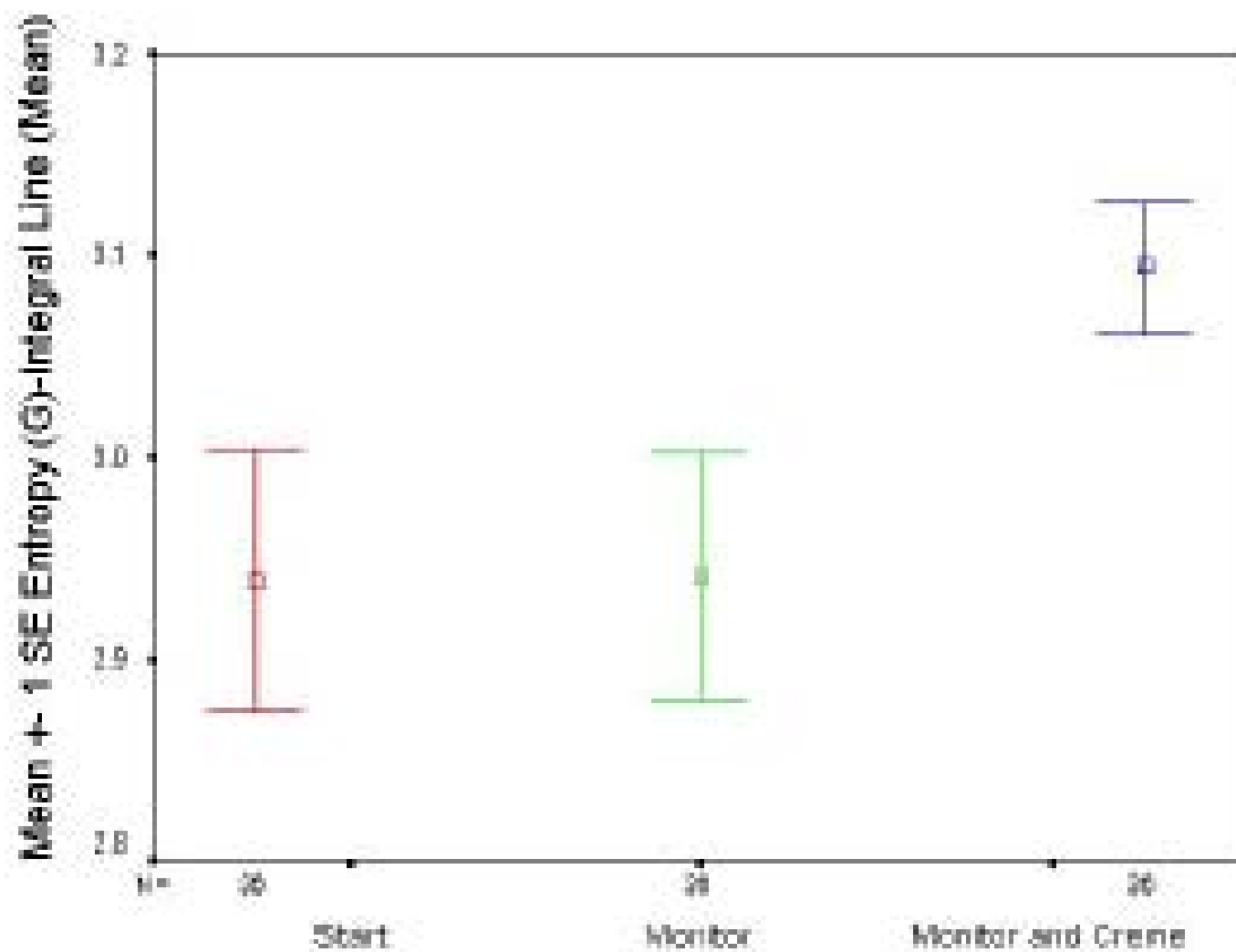
tor off showed no effects.

The results are analyzed in depth by scrutiny of figures 4-9. Fig. 4 and 5 display the statistical processing of a group of data [with standard deviation] in initial state, after the exposure to EMF from computer monitor and after exposure with active [anti-EMF] cream applied to the face. From these graphs, it can be concluded that there is no statistically significant difference between GDV area before or after exposure to EMF from computer's monitor. After application of cream, the increase of GDV area and for entropy was statistically significant.



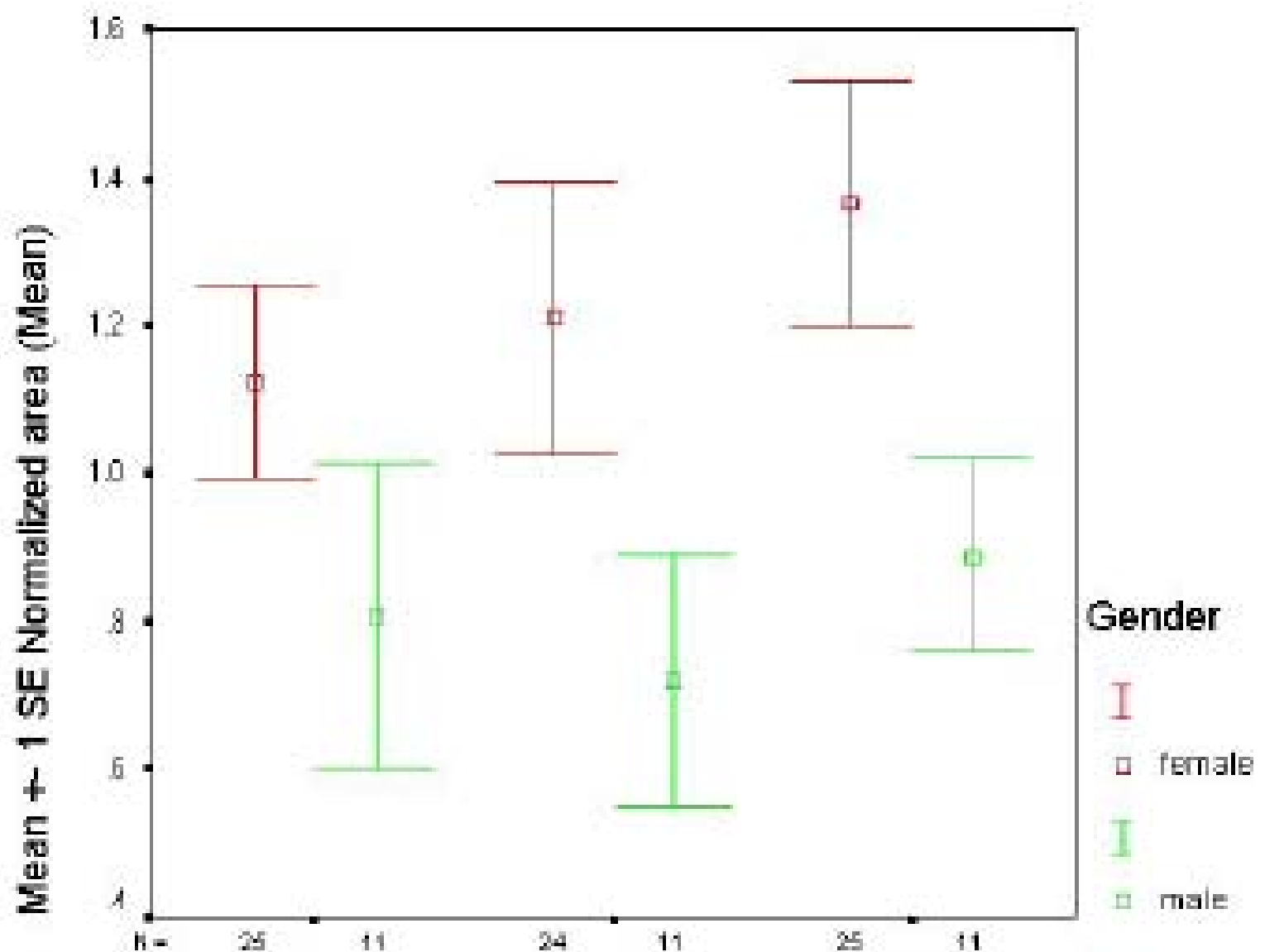
**Fig. 4.** Pooled data of normalized GDV area and standard deviation for a group of 35 volunteers exposed to EMF with or without anti-EMF cream.



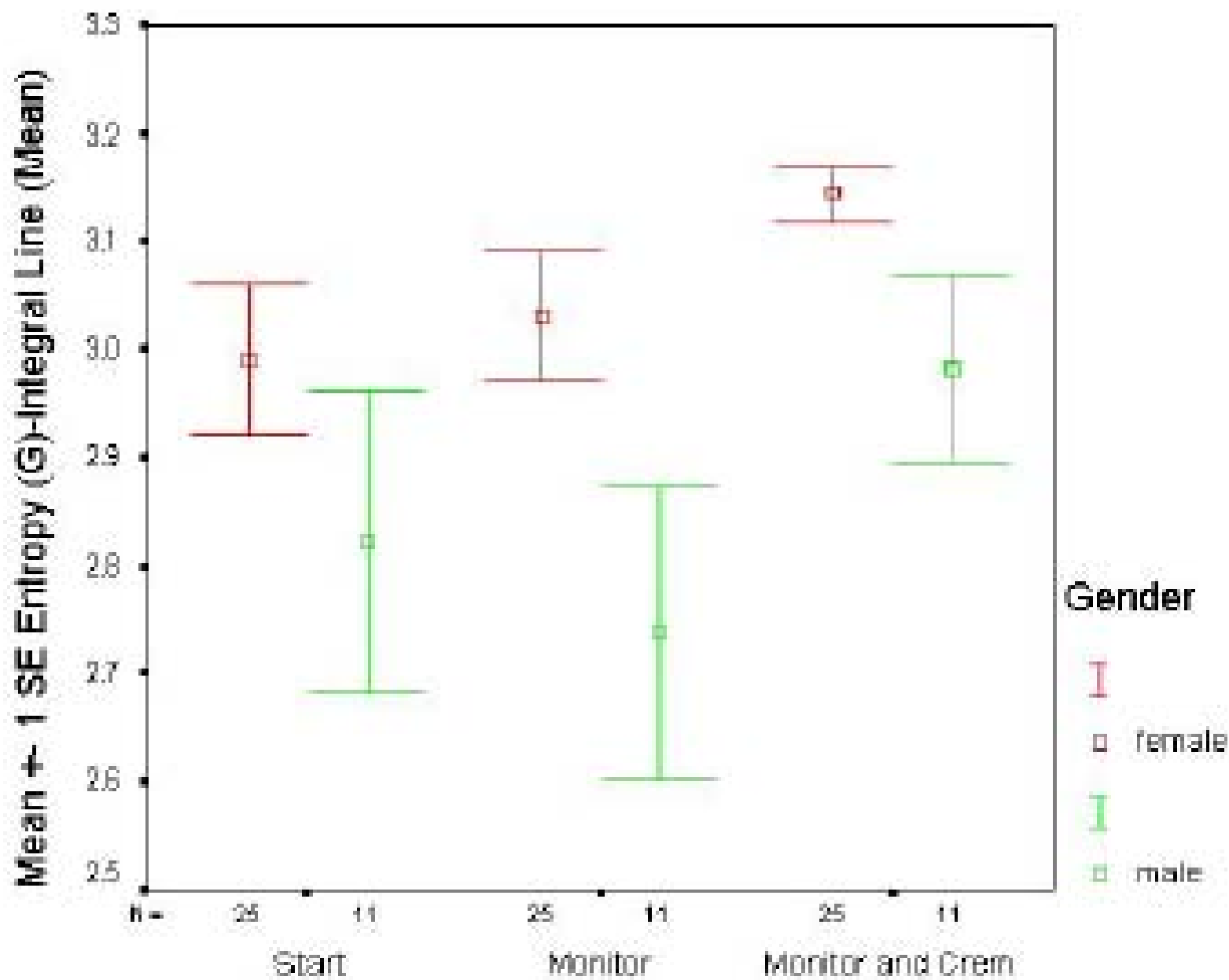


Parameter was calculated taking Mean from 60 Pictures

**Fig. 5.** Pooled data of GDV Entropy [and standard deviation] for a group of 35 volunteers exposed to EMF with or without an anti-EMF cream.



**Fig. 6.** Pool of data for normalized GDV Area with standard deviation for the groups of females and males volunteers exposed to EMF with or without an anti-EMF cream.

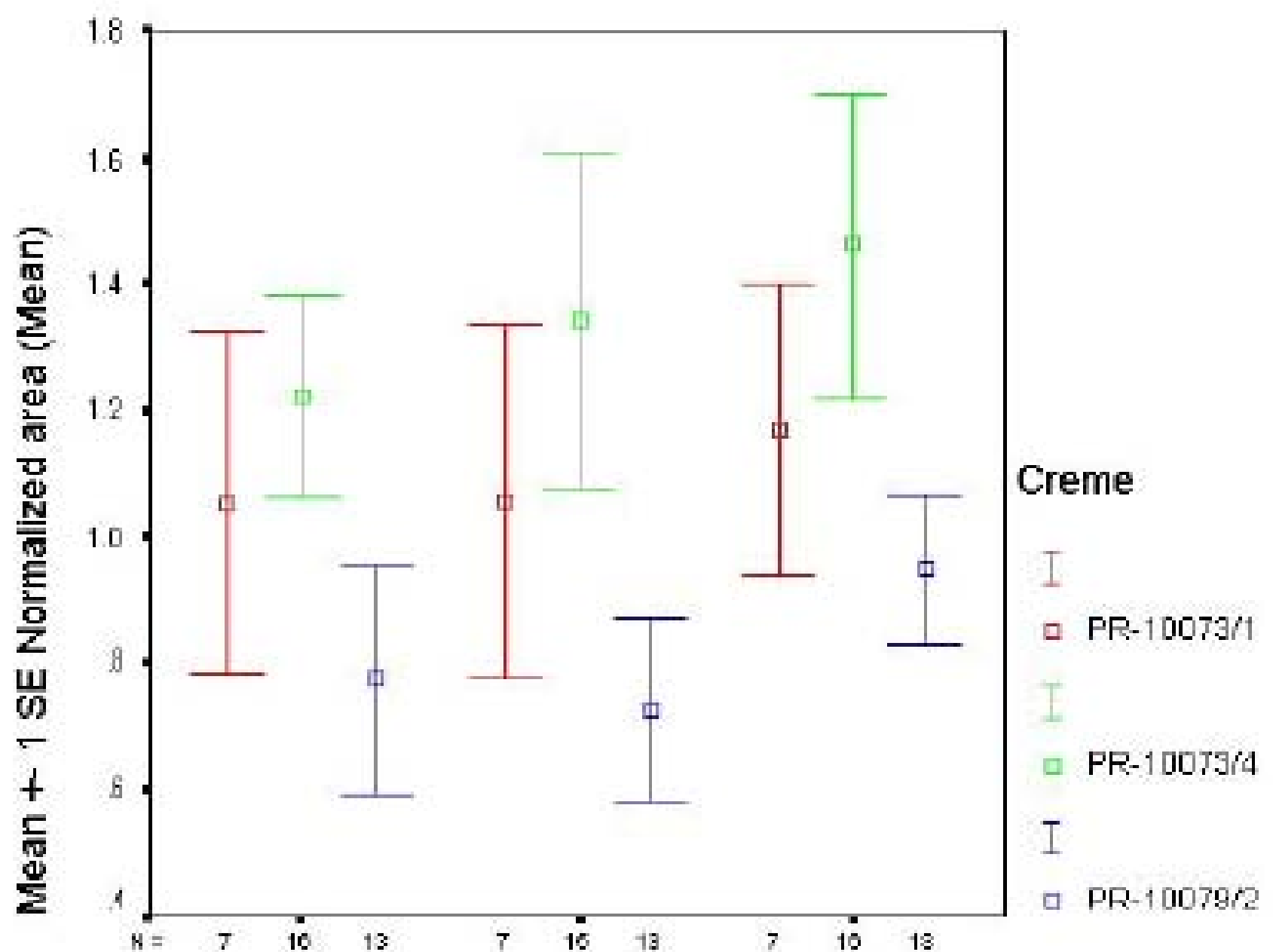


**Fig. 7.** GDV Entropy with standard deviation for the groups of females and males volunteers exposed to EMF with or without an anti-EMF cream.

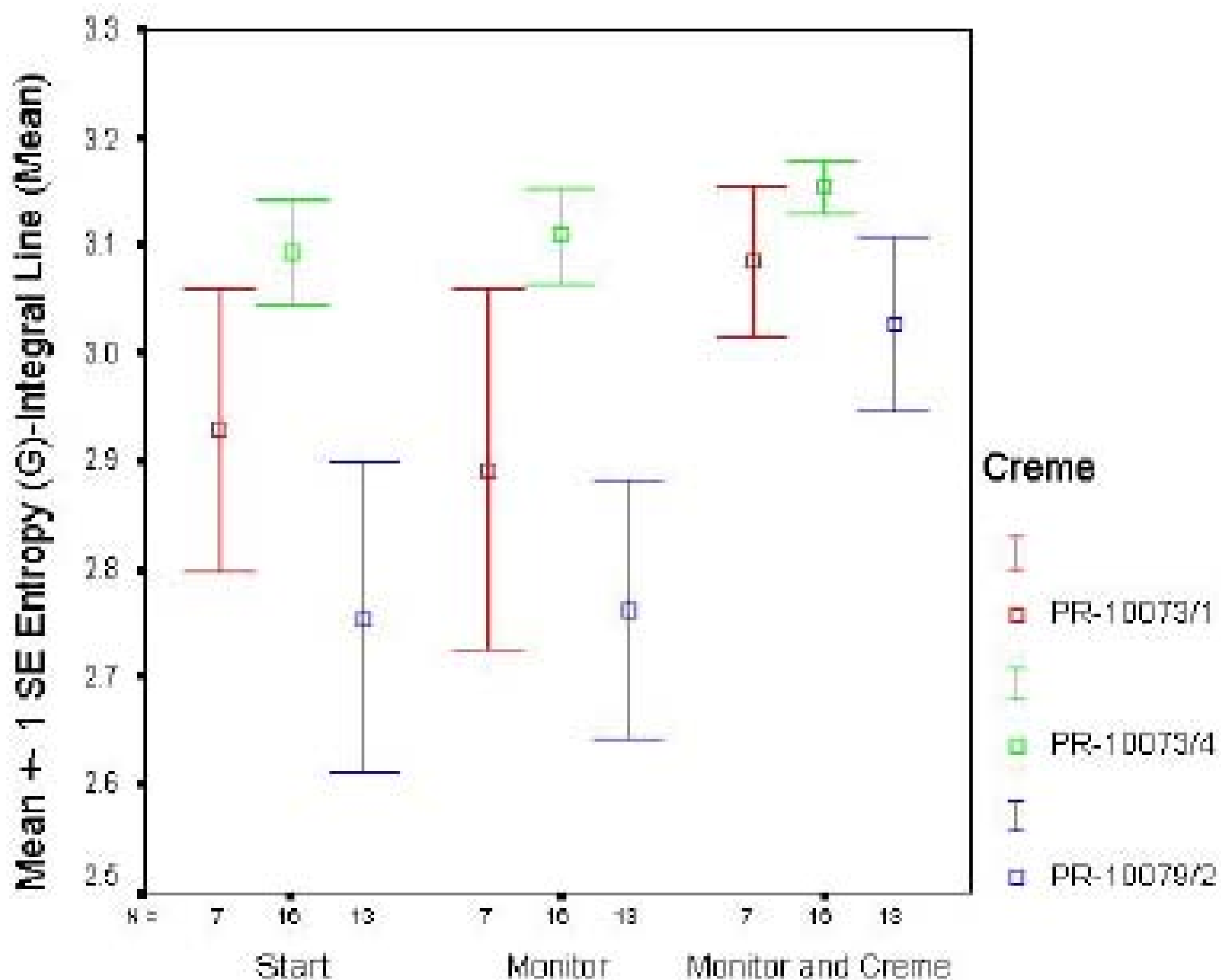
Fig. 6 and 7 display data distributed by gender. Females undergo a statistically significant difference between the GDV values before and after exposure to EMF, whereas such a difference is not found, for males. On the other hand, after application of anti-EMF cream, a statistically significant change of GDV parameters for both genders can be observed.



Fig. 8 and 9 display data obtained with different creams. GDV Area is modified by Anti EMF [10073/1] and Inert Powder [10079/2] creams, but practically no statistical group effect of Simplex [10073/4] cream. At the same time GDV Entropy is influenced by the presence of all the creams, but more strongly by Anti EMF and Inert Powder creams compared with Simplex cream.



**Fig. 8.** Pooled of normalized GDV Area with standard deviation for a group of 37 volunteers exposed to EMF with or without different creams.



**Fig. 9.** GDV Entropy with standard deviation for a group of 37 volunteers exposed to EMF with or without different creams.

## DISCUSSION

Data reported in this chapter demonstrate that reaction to the weak EMF strongly depends on the individual. It has the effect of modifying the area and fractality of GDV images on about 50% of the population studied. This correlates with results of other studies. The results indicate that radiation emitted from computer monitors inhibits corona dis-

charge formation at the surface of the skin. Both linear and nonlinear measures showed statistically significant changes. The fact that only 50% of the population show a sensitivity to computer monitor radiation is of further interest.

Human organs possess different electrical properties in accordance with the frequency and

intensity of the applied external EMF [23]. At some frequencies can behave as conductors, at others frequencies as dielectrics. Different content of water in tissues dictates different electrical and screening properties. For example, the brain is a paramagnetic tissue suspended in diamagnetic liquor that provides screening from the environmental magnetic fields, in particular from the variations of the geomagnetic field [16, 20, 21].

People display pronounced physiological reactions to the variation of the geomagnetic and artificial EMF: changes of arterial pressure, heart rate variability, breathing frequency,  $\text{Na}^+/\text{K}^+$  exchange rate, and other parameters were recorded in multiple stud-

ies [19, 11, 12, 13]. The level of these reactions depends on the type of central nervous system, age, gender and current physiological state of a person [14, 15, 17, 18, 22]. Possibly, there are critical days for every person, when physiological systems are most sensitive to the influence of natural and artificial EMF. We can conclude, that development of different means for protection from weak EMF is a task of practical importance.

Protective creams aimed at creating a thin conductive layer on the skin that prevents accumulating of surface charges results in successfully dampening of the intensity of the electric field and in the measurable reduction of the effect of EMF on area and fractality of GDV images.





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*"We can speak and think only of what exists. And what exists is uncreated and imperishable for it is whole and unchanging and complete. It was not or nor shall be different since it is now, all at once, one and continuous..."*  
*-Parmenides*

A large, textured, light beige circle with a black question mark in the center. The circle has a grainy, paper-like texture and is set against a dark grey background.

?